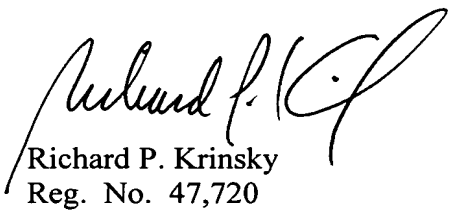
REMARKS

This Preliminary Amendment is to clarify portions of the Application, including the Specification and Claims, to add a new claim and to add a replacement Abstract of the Disclosure. Also included are a Substitute Specification, a marked-up copy of the Substitute Specification showing the changes made and an English-translation of the International Application. No new matter has been added.

The Application is now in condition for allowance, and such is respectfully requested.

It is respectfully requested that, if necessary to effect a timely response, this paper be considered as a Petition for an Extension of Time sufficient to effect a timely response and shortages in other fees, be charged, or any overpayment in fees be credited, to the Account of Barnes & Thornburg LLP, Deposit Account No. 02-1010 (677/44948).

Respectfully submitted,



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OF SUBSTITUTE SPECIFICATION

~~SEPARATOR HAVING A CENTRIFUGAL DRUM AND A PISTON SLIDE~~

BACKGROUND AND SUMMARY

[00001] The ~~invention~~ present disclosure relates to a separator having a rotatable drum with a vertical axis of rotation, in which ~~preferably~~ a plate stack is arranged~~, as well as having~~. The separator includes a piston slide for the opening and closing of solids discharge openings in the drum~~, in the~~. In an opened condition of the piston slide, a radial gap ~~being~~ is formed between the drum 2, ~~particularly between~~or a top part of the drum, and the piston slide.

[00002] In the case of separators of this type, which have piston slides, there is the need to reduce the occurrence of erosive phenomena in the area of the solids discharge openings, particularly evacuation slots, and to minimize the effect of the depositing of contaminations in this area.

[00003] Separators with piston slides are illustrated in German Patent Documents DE 38 03 762 A1, DE 102 20 757 A 1, DE 44 36 459 C2 and U.S. Patent Document US 5,916,083. Separators with nozzle openings are illustrated in German Patent Document DE 195 27 039 C1 and U.S. Patent Document US 290060,239.

[00004] ~~It is an object of the invention to reduce these disadvantageous effects.~~The present disclosure addresses the above-referenced needs.

[00005] The ~~invention achieves this task by means of the object of Claim 1~~present disclosure relates to a separator that includes a rotatable drum having a drum top part, a vertical axis of rotation and a disk stack arranged therein. Also included is a piston slide for opening and closing solids discharge openings in the drum. A radial gap is formed between the drum top part and the piston slide in an open condition of the piston slide. Also included is at least one annular chamber located on both sides of the radial gap in

front of the solids discharge openings in an outer circumference area of the piston slide and the drum top part.

[00006] Accordingly, as noted above, at least one annular chamber is constructed on both sides of the gap, radially in front of the solids discharge openings in the outer circumference area of the piston slide and the drum~~, particularly in the~~ top part ~~of the drum~~.

[00007] ~~Particularly preferably,~~ It may be that two radially successive annular chambers are constructed in the piston slide and in the top part of the drum~~, the~~. The two annular chambers ~~being~~ are constructed symmetrically with respect to the contact surface of the piston slide on the top part of the drum in the closed condition. Specifically, this construction causes considerably optimized flow conditions in the area of the discharge openings.

[00008] ~~Preferably, the~~The two annular chambers in the closed condition of the piston slide are constructed symmetrically with respect to the contact surface of the piston slide on the top part of the drum.

[00009] ~~The~~ A radially interior annular chamber of the annular chambers is ~~preferably~~ constructed as a fanning-out chamber for an exiting stream of solid matter.

[00010] ~~It is also advantageous for the~~A radially exterior annular chamber of the annular chambers ~~to be~~is constructed as a swirl chamber for the exiting stream of solid matter.

[00011] The ~~invention optimizes~~present disclosure relates to the flow conditions in the area in front of the solids discharge openings in a simple manner by an optimization of the geometry in the piston solid and drum elements, [[(]]particularly the top part of the drum[[)]], which are connected in front of the solids discharge openings~~, which only~~. This results in a corresponding treatment of these elements but not in additional expenditures of material. The ~~invention can therefore~~separator of the present disclosure can be implemented in a simple manner and minimizes not only the effect of the erosive

phenomena in the area of the solids discharge openings but also reduces the tendency to form deposits. ~~It therefore~~The separator according to the present disclosure contributes to a high operative readiness of the separator and to a reduction of the necessity of cleaning operations, particularly if two annular chambers are provided which follow one another radially and are connected by way of a bottleneck.

~~[00012] Advantageous embodiments and further developments are indicated in the subclaims.~~

~~13~~[00012] ~~In the following, the device according to the invention will be explained in detail by means of an embodiment with reference of the attached drawing~~.Other aspects of the present disclosure will become apparent from the following descriptions when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

~~14~~[00013] Figure 1 is a schematic, sectional view of a separator~~; and~~, according to the present disclosure.

~~15~~[00014] Figure 2 is a view of ~~a detail of the~~an area of a solids discharge opening on the drum of the separator of Figure 1 when the piston slide is open~~; and~~.

~~16~~[00015] Figure 3 is a view similar to that of ~~a detail from~~ Figure 2, when the piston slide is closed.

DETAILED DESCRIPTION

~~17~~[00016] Figure 1 is a schematic sectional view of a separator 1 with a rotatable drum 2 and a one-piece or multiple-piece non-rotatable hood 3 which surrounds the drum completely or for the most part. The drum 2 ~~with the~~has a vertical drum axis and axis of rotation M, and has an intake pipe 4 extending, for example, into the drum 2 from above. A distributor 5 is connected on ~~the~~ an output side of the intake pipe 4, through which distributor 5 ~~the~~ centrifugal material ~~can be~~is guided into the drum 2. A disk stack 6 of a plurality of conical disks 7 is arranged in the drum 2.

~~18~~[00017] The removal of~~, here~~, for example, two liquid phases from the drum 2 takes place

by ~~means of~~ two centripetal pumps or grippers 8, 9 to which outlet pipes 10, 11 are assigned.

~~19~~ [00018] For discharging solids accumulating in ~~the~~ a solids space 12, a piston slide 13 is ~~in each case~~ used ~~according to~~, as shown in Figures 1 to 3~~, which~~. Piston slide 13 can be operated, for example, pneumatically or hydraulically ~~in a manner not shown here~~ and opens up or closes solids discharge openings 14.

~~20~~ [00019] ~~To this extent,~~ Figure 1 ~~should be understood to be purely explanatory. It does not show the further development according to the invention in the area at the solids discharge openings~~ is an illustrated embodiment of the separator 1.

~~21~~ [00020] According to Figure 2, the solids discharge openings 14 are constructed as bores or slots in ~~the~~ a bottom part 15 of the drum 2, which slides discharge openings 14 extend through the bottom part 15 from ~~the~~ an inside to ~~the~~ an outside of the bottom part 15. The solids discharge openings 14 are uniformly distributed on ~~the~~ a circumference of the bottom part 15 of the drum 2, so that webs (not ~~visible here~~shown) remain in ~~each case~~ between the solids discharge openings 14.

~~22~~ [00021] In ~~the~~ a closed condition of the drum 1, the piston slide 13 rests against ~~the~~ a top part 16 of the drum~~, in which case, preferably at the~~ 2 at a lower edge of the top part 16 of the drum 2~~, a~~. A sealing ring 17 is arranged in a groove 18 in the top part 16 of the drum 2. In the closed condition, [[~~(~~]]when the piston slide 13 is moved upward[[~~)~~]], the sealing ring 17 closes or seals off ~~the~~ a gap 19 between ~~the~~ adjoining surfaces 20, 21 of the piston slide 13 and of the top part 16 of the drum ~~(in the embodiment according to the invention corresponding to Figure 3)~~, as shown in Figure 3.

~~23~~ [00022] ~~In the case of the constructions known so far, when~~When the piston slide 13 is open or opening, ~~the~~ an exiting solids stream S ~~often~~ impacts in a narrowly focused manner on points of the bottom part 15 of the drum, for example, on ~~the~~ edges of the solids discharge openings 14. This leads to erosive phenomena and deposits in the gaps

between these elements, mainly in ~~the~~ an axial gap between the piston slide 13 and the bottom part 15 of the drum 2 and between the top part 16 of the drum 2 and the bottom part 15 of the drum 2.

~~24~~[00023] ~~While~~ Figure 2 illustrates the open condition of the piston slide 13, in which the gap 19 is formed, and Figure 3 shows the closed condition of piston slide 13. ~~The gap~~A width ~~S~~ of gap 19 may slightly vary in practice from one opening operation to the next. The following conditions ~~therefore~~ relate to a desired opening position, as suggested in [[(]]Figure 2[[)]], which, on average, is to be achieved by ~~means of~~ the piston slide 13. The lower surface 20 of the top part 16 of the drum 2 represents a fixed reference plane, from which the piston slide 13 moves away during the opening.

~~25~~[00024] Two radially successive annular chambers 22 and 23 ~~respectively~~ are constructed radially outside the sealing groove 18 in the piston slide 13 and the top part 16 of the drum 2 ~~in each case~~ on both sides of the gap 19 ~~or here~~. The chambers 22, 23 lie symmetrically in the open condition with respect to ~~the~~ a center plane E of the gap 19, [[(]]and in the closed condition, symmetrically with respect to the surface 20~~), which annular~~. Annular chambers 22 and 23 extend either in a surrounding manner over ~~the~~ an entire circumference or at least ~~in each case~~ on ~~the~~ a circumference over ~~the~~ an area which corresponds with the solids discharge openings 14.

~~26~~[00025] ~~When, in the following,~~References to the interior and the exterior annular ~~chamber~~ chambers 22, 23 ~~is addressed, this applies in each case~~apply to the ~~two~~ interior and exterior annular chambers in the piston slide 13 and in the top part 16 of the drum 2.

~~27~~[00026] The radially interior annular chamber 22 ~~of the two annular chambers 22~~ starts just radially outside the sealing groove 18 in the top part 16 of the drum 2 or at ~~the~~ a corresponding point of the piston slide 13 at a ~~kind of~~ sharp edge 24 at a radius ~~r1~~ r_1 [[(]]starting from the drum axis M ~~see Figure 1~~ or ~~here also~~ measurable from ~~the~~ a groove edge of the groove~~) and~~ 18. Chamber 22 widens at a radius point ~~r2~~ r_2 to a

maximal axial dimension ~~H1 ("axial" meaning in~~H_1, where axial means a direction parallel to the drum axis M~~; see Figure 1)~~ and then narrows again to an axial dimension ~~H4~~ H_4 at a ~~radial point r2, to a~~ narrowing or bottleneck 25 at a radius point r_3.

~~28]~~[00027] A nozzle-type fanning-out chamber 22 is thereby created which, in ~~the~~ an average open condition, has a radial dimension ~~r3 – r1~~ $r_3 - r_1$, which is more than twice as large as ~~its~~ a maximal axial dimension or height ~~H1~~H_1.

~~29]~~[00028] In the average open condition, the axial dimension of the narrowing ~~24~~ 25 is greater than ~~the~~ a height or ~~the~~ axial dimension of the gap 19.

~~30]~~[00029] In the average open condition, the maximal axial dimension ~~H1~~ H_1 of the fanning-out chamber 22 is smaller, ~~preferably~~ for example, more than 50% smaller than the axial dimension ~~H2~~ H_2 of the solids discharge openings 14 in the bottom part 15 of the drum 2.

~~31]~~[00030] As a result, the solids stream exiting through the gap 19 when the piston slide 13 is open is fanned out widely and impacts largely unbundled on ~~the~~ a web of the bottom part 15 of the drum 2. This has the purpose of minimizing as much as possible the erosion wear on the bottom part 15 of the drum 2 caused by the stream of solid matter.

~~32]~~[00031] Starting from the narrowing 25, recesses in the piston slide 13 and drum top part 16 elements widen with an increasing radius ~~(R; see Figure 1)~~, shown as R in Figure 1, to the drum axis ~~(M) again~~M on both sides of the gap 19 almost in the manner of a ring with quadrant geometry to form the radially exterior annular chamber 23. However, these annular chambers 22, 23 widen beyond the axial dimension ~~H2~~ or height H_2 of the solids discharge openings 14 to an axial dimension ~~H3~~ H_3 which is ~~greater, particularly~~larger, possibly more than twice as large, than the axial dimension ~~H2~~ H_2 of the solids discharge openings 14 in the average open condition.

~~33]~~[00032] The annular chambers 22, 23 then narrow slightly ~~again~~ just in front of ~~the~~ outer radius r_4 of the piston slide~~, and then axially~~ (13. Then axially, relative to the drum axis M[[)]], on both sides of ~~the~~ outer edges of the solids discharge openings 14, chambers 22,

23 abut ~~the~~ an inner circumferential wall of the bottom part 15 of the drum 2 at the outer radius ~~r4~~ r_4 at ~~the~~ a gap between the piston slide 13 and the bottom part 15 of the drum 2 or between the top part 16 of the drum 2 and the bottom part 15 of the drum 2.

~~34~~ [00033] During the exiting of the solids from the interior annular chamber 22, the solids impact at a high speed on the inner circumferential wall of the bottom part 15 of the drum 2, so that a portion of the exiting stream of solids is reflected back into the annular chamber 23. These particles are guided in the annular chamber 23 in the curved manner of arrows P and then exit from the solids discharge openings 14~~, so that~~. Thus, a depositing of solids in ~~the~~ an area of these annular chambers 22, 23 and/or of the gaps between the bottom part 15 of the drum 2 and the piston slide 13 and the top part 15 of the drum 2 is effectively prevented.

~~35~~ [00034] ~~While, in~~In the case of conventional separators, ~~the~~ an exit height of the gap 19 is smaller than that of the solids discharge openings 14~~, this is reversed here~~. In the present disclosure, the exit height H_3 of gap 19 is larger than a height H_2 of the solids discharge openings 14.

[00035] Although the present disclosure has been described and illustrated in detail, it is to be clearly understood that this is done by way of illustration and example only and is not to be taken by way of limitation. The scope of the present disclosure is to be limited only by the terms of the appended claims.

~~LIST OF REFERENCE SYMBOLS~~

~~Separator~~	~~1~~
~~drum~~	~~2~~
~~hood~~	~~3~~
~~drum top part~~	~~X~~
~~intake pipe~~	~~4~~
~~distributor~~	~~5~~
~~disk stack~~	~~6~~
~~disks~~	~~7~~
~~centripetal pumps~~	~~8, 9~~
~~outlet pipes~~	~~10, 11~~
~~solids space~~	~~12~~
~~piston slide~~	~~13~~
~~solids discharge openings~~	~~14~~
~~drum bottom part~~	~~15~~
~~drum top part~~	~~16~~
~~sealing ring~~	~~17~~
~~groove~~	~~18~~
~~gap~~	~~19~~
~~surfaces~~	~~20, 21~~
~~annular chambers~~	~~22, 23~~
~~sharp edge~~	~~24~~
~~narrowing~~	~~25~~
~~radii~~	~~r1 - r4~~
~~extensions~~	~~H1 - H3~~
~~drum axis~~	~~M~~